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Robert C. Knauerhase

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INTEL CORPORATION

c/o CPA Global

P.O. BOX 52050

MINNEAPOLIS, MN 55402

EXAMINER

KAWSAR, ABDULLAH AL

ART UNIT

PAPER NUMBER

2195

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/733,177	Applicant(s) KNAUERHASE ET AL.	
	Examiner ABDULLAH AL KAWSAR	Art Unit 2195	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 02 March 2009.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-43 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-43 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 10 December 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. Claims 1-43 are pending.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 41-43 are rejected under 35 U.S.C. 102(b) as being anticipated by Mori et al.(Mori) US Patent Application Publication No. 2002/0013802.

4. As per claim 41, Mori teaches the invention as claimed including a method comprising:
evaluating the usage by a virtual machine of each of a plurality of resources, including at least processing capability, to which access is controlled by a virtual machine monitor (par. 0017; par. 0004; par. 0028; par. 0036); and

reallocating only a portion of the processing capability to the virtual machine based, at least in part, on the evaluated usage (par. 0028, lines 4-7; par. 0049; par. 0051; par. 0052; figure 4; par. 0039).

5. As per claim 42, Mori teaches includes establishing affinity between the virtual machine and one of a processor and a core (par. 0018; par. 0029; par. 0030; figure 4; par. 0004; par. 0039).

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6. As per claim 43, Mori teaches wherein the portion is a portion of processor time (par. 0039).

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 1-40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mori et al.(Mori) US Patent Application Publication No. 2002/0013802, in view of Waldspurger (Waldspurger) US Patent No. 7412492.

9. As per claim 1, Mori teaches the invention substantially as claimed including a method comprising:

evaluating the usage by a first of a plurality of virtual machines of each of plurality of physical resources, including at least one of an input device, a display device, and a communication device, to which access is controlled by a virtual machine monitor (par. 0017; par. 0004; par. 0028; par. 0036); and

reallocating only a subset(memory) of the plurality of physical resources to the first virtual machine based, at least in part, on the evaluated usage (par. 0028, lines 4-7; par. 0049; par. 0051; par. 0052; figure 4).

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Mori do not specifically disclose the subset including at least one of the input device, the display device, and the communication device.

However Waldspurger teaches the subset including at least one of the input device, the display device, and the communication device (col 5, lines 6-17; col 6, lines 56-67).

10. It would have been obvious to a person of ordinary skill in art at the time of invention was made to incorporate the teaching of Waldspurger into the method of Mori to reallocate subset of resources including at least one of the input device, the display device, and the communication device. The modification would have been obvious because one of the ordinary skills of the art would utilize the method of Waldspurger monitor all the different types of resources including input device, the display device, and the communication device and reallocate only the portion of resource needed for better resource allocation.

11. As per claim 2, Mori teaches monitoring the usage by a second of the plurality of virtual machines of at least one of the plurality of physical resources (par. 0007; par. 0009; par 0035, lines 1-11).

12. As to claim 3, Waldspurger teaches monitoring the usage includes monitoring the mapping of the virtual resource to a physical resource (col 5, lines 6-16).

13. As per claim 4, Mori teaches monitoring the usage includes: monitoring the usage substantially in parallel with executing the virtual machine (par. 0034; par 0035, lines 1-11).

14. As per claim 5, Mori teaches reallocating only a subset of the plurality of physical resources to the virtual machine based, at least in part, on the evaluated usage includes: either increasing or decreasing the ability of the first virtual machine to access one of the plurality of physical resources (par. 0016; par. 0048; figure 4).

15. As per claim 6, Mori teaches reallocating only a subset of the plurality of physical resources to the first virtual machine includes(par. 0028, lines 4-7; par. 0049; par. 0051; par. 0052; figure 4): increasing the ability of the first virtual machine to access a first physical resource(par. 0016); and

decreasing the ability of the first virtual machine to access a second physical resource (par. 0016).

16. As per claim 7, Mori teaches reallocating only a subset of the plurality of physical resources to the first virtual machine includes a reallocation selected from a group including the following: altering the order in which the first virtual machine and the second virtual machine are executed, swapping between the first and second virtual machine, assigning core affinity to one of the first virtual machine and the second virtual machine, assigning a processor affinity to one of the first virtual machine and the second virtual machine, and altering the time quanta assigned to at least one of the first virtual machine and the second virtual machine (par. 0018; par. 0029; par. 0030; figure 4; par. 0004; par. 0039).

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17. As per claim 8, Mori teaches reallocating only a subset of the plurality of the physical resources to the first virtual machine is performed by the virtual machine monitor having a resource manager to evaluate the first virtual machine activity (par. 0036).

18. As per claim 9, Mori teaches the resource manager is a part of an integrated circuit(par. 0036).

19. As per claim 10, Mori teaches evaluating the usage includes:

determining whether the activity of the first virtual machine is sufficient to trigger a change in the resource allocation (par. 0010; par. 0028);

suggesting a resource allocation (par. 0052); and

determining whether the suggested resource allocation negatively impacts the performance of another virtual machine (par.0056).

20. As per claim 11, Mori teaches the invention as claimed including an article comprising:

a storage medium having a plurality of machine accessible instructions, wherein when the instructions are executed, the instructions provide for(par. 0034, lines 1-4):

evaluating the usage by one or more virtual machines of one or more physical resources, including at least one of an input device, a display device, and a communication device, to which access is controlled by a virtual machine monitor (par. 0017; par. 0004; par. 0028; par. 0036);
and

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reallocating only a subset of the physical resources to the virtual machine(s) based, at least in part, on the evaluated usage (par. 0028, lines 4-7; par. 0049; par. 0051; par. 0052; figure 4).

Mori do not specifically disclose the subset including at least one of the input device, the display device, and the communication device.

However Waldspurger teaches the subset including at least one of the input device, the display device, and the communication device (col 5, lines 6-17; col 6, lines 56-67).

21. As per claim 12, Mori teaches monitoring the activity of one or more virtual machines (par. 0007; par. 0009).

22. As per claim 13, Mori teaches monitoring the activity of one or more virtual machines includes monitoring an activity selected from a group including: interrupt usage, processor usage, network usage, disk usage, and whether the virtual machine is performing a time-critical task (par. 0030).

23. As per claim 14, Mori teaches monitoring the activity of one or more virtual machines includes: monitoring the activity of the virtual machine substantially in parallel with executing the virtual machine (par. 0034).

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24. As per claim 15, Mori teaches reallocating physical resources to the virtual machine(s) based, at least in part, on the evaluated activity includes: either increasing or decreasing the ability of the virtual machine(s) to access to a physical resource (par. 0016).

25. As per claim 16, Mori teaches reallocating physical resources to the virtual machine(s) includes: increasing the ability of the virtual machine(s) to access to a first physical resource(par. 0016); and

decreasing the ability of the virtual machine(s) to access to a second physical resource (par. 0016).

26. As per claim 17, Mori teaches reallocating physical resources to the virtual machine(s) includes a reallocation selected from a group including the following: altering the order in which the virtual machine(s) are executed, swapping between virtual machines, assigning core affinity to a virtual machine, assigning a processor affinity to a virtual machine, and altering the time quanta assigned to the virtual machine(s) (par. 0018; par. 0029; par. 0030; figure 4; par. 0004; par. 0039).

27. As per claim 18, Mori teaches reallocating physical resources to the virtual machine(s) is performed by the virtual machine monitor having a resource manager to evaluate the virtual machine(s) activity (par. 0036).

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28. As per claim 19, Mori teaches the resource manager is a part of an integrated circuit (par. 0036).

29. As per claim 20, Mori teaches evaluating the activity of one or more virtual machines includes:

determining whether the activity of the virtual machine(s) is sufficient to trigger a change in the resource allocation (par. 0010);

suggesting a resource allocation (par. 0052); and

determining whether the suggested resource allocation negatively impacts the performance of another virtual machine (par.0056).

30. As per claim 21, Mori teaches the invention as claimed including an apparatus comprising:

a plurality of physical resources, including at least one of an input device, a display device, and a communication device (par. 0004);

a plurality of virtual machines, capable of sharing the plurality of physical resources (par. 0030);

an activity monitor, capable of monitoring the activity of the virtual machines, the activity including usage of the plurality of physical resources (par. 0004; par. 0017);

a virtual machine manager, capable of managing the virtual machines and reallocating access to the physical resources amongst the virtual machines, based at least in part on the monitored activity (par. 0047; par. 0048; par. 0028, lines 4-7).

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31. As per claim 22, Mori teaches the virtual machine monitor includes a resource manager that is capable of reallocating access to the physical resources amongst the virtual machines (par. 0036).

32. As per claim 23, Mori teaches the activity monitor is capable of monitoring an activity selected from a group including: interrupt usage, processor usage, network usage, disk usage, and whether the virtual machine is performing a time-critical task (par. 0030).

33. As per claim 24, Mori teaches the activity monitor is capable of monitoring the activity of the virtual machines substantially in parallel with the execution the virtual machines (par. 0034).

34. As per claim 25, Mori teaches the virtual machine monitor is capable of either increasing or decreasing the ability of the virtual machine(s) to access to a physical resource (par. 0016).

35. As per claim 26, Mori teaches virtual machine monitor is capable of reallocating physical resources to the virtual machine(s) via: increasing the ability of the virtual machine(s) to access to a first physical resource (par. 0016); and

decreasing the ability of the virtual machine(s) to access to a second physical resource (par. 0016).

36. As per claim 27, Mori teaches virtual machine monitor is capable of reallocating physical resources to the virtual machine(s) by selecting from a group including the following: altering

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the order in which the virtual machine(s) are executed, swapping between virtual machines, assigning core affinity to a virtual machine, assigning a processor affinity to a virtual machine, and altering the time quanta assigned to the virtual machine(s) (par. 0018).

37. As per claim 28, Mori teaches the resource manager is further capable of evaluating the monitored activity of the virtual machine(s) (par. 0017).

38. As per claim 29, Mori teaches the resource manager is capable of evaluating the monitored activity of the virtual machine by (par. 0030):

determining whether the activity of the virtual machine(s) is sufficient to trigger a change in the resource allocation (par. 0010);

suggesting a resource allocation (abstract, lines 13-14); and

determining whether the suggested resource allocation negatively impacts the performance of another virtual machine (par. 0034).

39. As per claim 30, Mori teaches the activity monitor and virtual machine monitor are integrated into the same circuit (par. 0036).

40. As per claims 31-40, they have similar limitations as of claims 21-30 above. Therefore, they are rejected under the same rationale as of claims 21-30 above.

Response to Arguments

41. Applicant's arguments with respect to claim(s) have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

42. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

43. A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

44. Any inquiry concerning this communication or earlier communications from the examiner should be directed to ABDULLAH AL KAWSAR whose telephone number is (571)270-3169. The examiner can normally be reached on 7:30am to 5:00pm, EST.

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45. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Meng Ai T. An can be reached on 571-272-3756. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

46. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/VAN H NGUYEN/
Primary Examiner, Art Unit 2194

/Abdullah-Al Kawsar/
Examiner, Art Unit 2195